CHAPTER FOUR
FUTURE LAND USE
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CHAPTER FOUR– FUTURE LAND USE AND GROWTH STRATEGIES

INTRODUCTION

Residential development projections in this chapter are based on analysis of a variety of factors, including, but not limited to, existing and projected population estimates, real estate trends, existing development patterns, availability of land, utilities, infrastructure, local workforce and market, location, and geography. Analysis of these factors allows development projections, preferred land use alternatives, policy and regulation development to guide future growth in the City.

The "Future Land Use Map" (**Ref. Map 7**) shows the future development patterns for the City of Ottawa both within the current city limits and in the City's "Planning Areas" (**Ref. Map 1)**. These are based on the land use projections, market trends and demands, land use planning principles and land serviceability. The planning area depicted on the maps was devised based on projections about where the Ottawa is likely to grow. Areas designated as 100-year flood plains by FEMA were excluded from the planning area as development is unlikely to occur, and would be discouraged, in these areas.

This chapter includes the Major Thoroughfare Plan element of the Comprehensive Plan, including an expanded Major Thoroughfare Plan Map (**Ref. Map 6**) that extends arterial and collector streets into the growth areas.

FUTURE LAND USE PROJECTIONS

Population Projections

Future land use projections are based—among other things—on the future population projections for the City of Ottawa. The projected Ottawa growth through 2020 is based on several demographic trends and existing conditions outlined in *Chapter Two—Existing Conditions and Demographics.* The Plan considered different population growth scenarios.

Three population projection scenarios have been presented here **(Ref. Table 4.1).** The first method uses linear regression to project population increases between 2000 and 2020. This method closely replicates the actual pattern of growth that has occurred in Ottawa in the last thirty years. The method predicts a 1.2% declining rate between 2000 and 2010 and another 2.1% growth rate between 2010 and 2020. It yields an increase in the population by 100 people by 2020. This growth rate has been affected by the decline in Ottawa's population in the 1980s. And given the 12% increase in population during the 1990s, this population projection is highly unlikely and therefore of little value.

The second and third methods use the Kansas Water Office's[1] population projections that were done in the early 1990s, based on the 1990 Census. The year 2000 projection for the City of Ottawa overshot by 500 people. Assuming a similar growth rate as predicted by the Kansas Water Office Ottawa's population will increase by 1,750 persons by 2010 and will increase by another 1,750 people by 2020.

The third method uses the Kansas Water Office's projections for Franklin County. The County is projected to grow at a slightly lower rate than the City of Ottawa, but is nevertheless one of the strongest growth rates in the region. Based on the County's growth rate, Ottawa is projected to add 1,450 people by 2010 and another 1,450 people by 2020.

Table 4.1: Population Projection Scenarios (2000-2020)

SCENARIO		1970	1980	1990	2000	2010	2020
Using Linear Regression for population 1960 to 2000							
I	Linear Projection	10,919	11,157	10,628	11,921	11,776	12,023
	Growth rate		2.18%	-4.74%	12.17%	-1.22%	2.10%
Kansas Water Office Projections for Ottawa							
II	Ottawa (adjusted for 2000 Census)	10,919	11,157	10,628	11,921	13,668	15,414
	Ottawa (based on 1990 Census)			10,667	12,421	14,241	16,061
	Growth rate				16.44%	14.65%	12.78%
Projections for Ottawa based on KWO Projections for Franklin County							
III	Ottawa (adjusted for 2000 Census)	10,919	11,157	10,628	11,921	13,372	14,823
	Franklin County (based on 1990 Census)			21,994	24,933	27,968	31,003
	Growth rate				13.36%	12.17%	10.85%

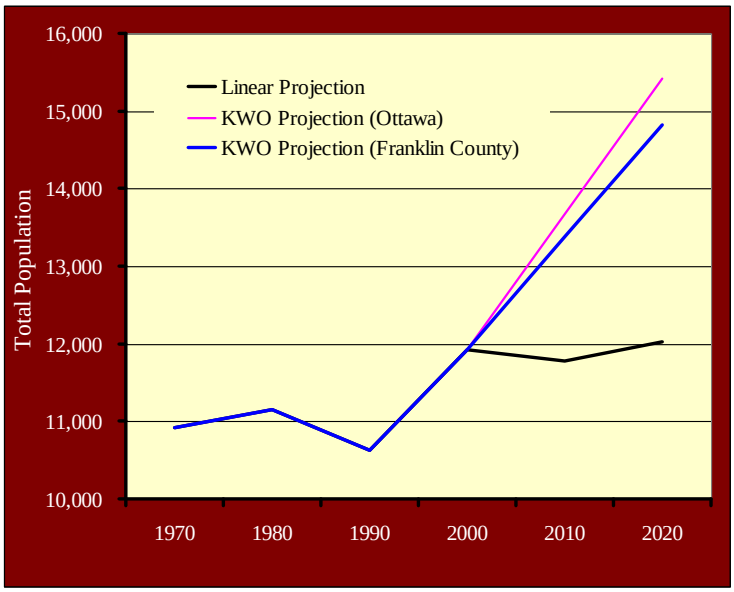
Source: Kansas Water Office, BWR

(see figure next page)

[1] In 1996, the Kansas Water Office was requested by the Kansas Water Authority to develop a methodology for preparing water demand projections. An intermediate project of this study involved the preparation of population projections for every city, rural water district, and county in Kansas.

The Kansas Water Office presented the population projections to the Division of the Budget which is responsible for certifying the state's official population as well as presenting the state's official population projections. By statute, the Division of the Budget uses the latest sub-county estimates produced by the U.S. Census Bureau as the official population. Prior to certification, the Division of the Budget reviews the Bureau's estimates for each county, city, and township in Kansas. It is during the review stage that the Division of the Budget works in cooperation with the Kansas Water Office to analyze the accuracy of the population estimates. The process is efficient and believed to be a responsible use of state resources because federal efforts are not duplicated at the state level.
In June 1999, the Kansas Water Office's methodology was first used to review population estimates and the Division of the Budget endorsed the agency's population projections as the official Kansas projections.

Figure 4.1: Population Projection Scenarios (2000-2020)



Source: Kansas Water Office, BWR

Housing Demand Analysis and Residential Land Area Needs

The housing vacancy rate in Ottawa has increased from 7.3 percent in 1990 to 7.5 percent in 2000—a higher rate probably reflects an increasing rental housing market, which increased from 32% to 35% of total housing stock in Ottawa **(Ref. Chapter 2: Existing Conditions and Demographics)**. Rental housing, typically, has a higher vacancy rate. The average household size in Ottawa has fallen from 2.5 in 1990 to 2.43 in 2000, which is also a nationwide trend, increases the demand for new housing units relative to the population as a whole. That is, it takes more housing to shelter the same size population as the average number of persons per household declines. An increasing population probably will lead to even more rapidly increasing demands on the housing supply.

Table 4.2 projects the demand for new housing units in Ottawa based on population changes and assuming either no change in the average household size by 2010 (remaining at 2.43) or with household size decreasing between 1990 and 2000 (reducing to 2.3). Future demand is estimated using the same numbers as used for the graph above.

- No change in household size scenario suggests that about 100 housing units would have to be built in Ottawa each year over the next decade in order to keep pace with potential demand.
- If household size continues to decrease (which is expected if a broader range of household types is attracted to the community, and the City becomes more like the Control cities (Average household sizes in Lawrence is 2.30, Winfield: 2.60, El Dorado: 2.33), say 2.3 persons per household), the average annual need for construction in the City would increase, in this case to a projected 105 housing units per year.

Table 4.2: Housing Demand for Ottawa, 1990-2020

	2000	2020	2010 Same HH Size	2010 New HH Size	2020 New HH Size
HIGH GROWTH SCENARIO					
Population	11,921	15,414	13,668	13,668	15,414
Average persons per household	2.43	2.43	2.43	2.3	2.3
Vacancy rate	7.5%	5%	5%	5%	5%**
Unit needs at end of period	-	-	760	800	800
Cumulative replacement need	-	500	250	250	250
Cumulative need during period	-	2,020-2,100	1,010	1,050	1,050
Average annual need	-	**103**	**100**	**105**	**105**

Source: BWR

** Household size assumed to continue to decline reflecting nationwide trends*

*** Vacancy rate to decline further as land is more competitive.*

Ottawa is projected to need about 2,540 housing units in 20 years. If Ottawa were to absorb all of the housing construction projected, it would require more than 800 additional acres of land in 20 years for residential development under the "new household size" scenario, assuming:

- An average of four units per acre for planning purposes to accommodate higher density development; and
- About 27 percent of acreage is devoted to streets, easements, and other public facilities.

To ensure that prospective developers have ample land from which to choose in planning for Ottawa's housing growth, even more land should be anticipated for residential development than the desired average density would yield. For long-range planning purposes, the land area is multiplied by a factor of 2.5 which indicates a projected need for a total of 2,016 acres to plan for residential purposes, or about 3.15 square miles of residential land area which will be subject to near-term development pressures.

Finally, when planning for growth, the City must work within systemic regions, such as entire drainage basins or sub-basins that gravity-flow to the Marais Des Cygnes River and its tributary creeks. As a result, Ottawa's Planning Area (where long-term development is shown on the Future Land Use map) is quite extensive, and not just where tomorrow's or next year's growth occurs.

FUTURE LAND USE MAP

The Future Land Use map **(Ref. Map 7)** shows development patterns for the City of Ottawa and its Planning Area. These projections are based on the population projections, land use planning principles, and development patterns identified in the study. The "Future Land Use Categories" of the map legend correspond generally to zoning district classifications in the City of Ottawa Zoning Ordinance, but are more descriptive of land use policies in the Comprehensive Plan that seek to anticipate and accommodate more market-driven development patterns. The Plan should be used as prescribed in State Statute: as a guide for future zoning decisions. The land use categories of the Future Land Use map are defined in **Table 4.3**.

Table 4.3: Future Land Use Categories

Land Use Category	Description
Residential Land Uses	
Low-density (Single-family) Residential	This residential category is primarily for single-family residential development that ranges from very low density residential with limited farming activities to single-family subdivisions with a maximum density of what the current zoning ordinance allows. It also allows single-family cluster development as a planned use and medium density residential uses that are compatible with surrounding single-family development. This use category also accommodates public uses, such as schools, libraries, churches, fire stations, parks and open space. These public uses should be strategically located to promote convenient access for all modes of transportation and city services.
High-Density and Multifamily Residential	This category is primarily for accommodating high-density and multifamily residential housing consisting of a variety of housing types and densities. Public uses and accessory uses that are complimentary and subordinate to apartment complexes are allowed. This district is designed for areas served by publicly-provided sanitary sewers and water. The category is also intended to provide for the uniform development of manufactured home subdivisions.
Multi-Use Land Uses	
Public/Semi-public	This category is intended to include all public, semi-public and institutional uses, except conservation areas. All public/institutional facilities should have access to arterials, public transportation, pedestrian pathways and major utility trunk lines; these uses are not prohibited in other categories if applicable zoning and design criteria are met.
Commercial/Residential (Mixed Use)	This category is primarily for residential housing of mixed densities, with limited non-residential uses of neighborhood scale developed through compatible site planning. Commercial uses shall be limited to compact, pedestrian oriented, shopping, services, office, and limited entertainment uses. All non-residential uses should be made compatible with residential uses through adopted site design standards. Land use transitions, particularly for road and drive access should be site-planned based on adopted standards, and as Overlay Districts that articulate and implement unique needs of each sub-area.

Business Park	The business park district is designed to accommodate a variety of offices and office-compatible industries that are not generally considered conventional light or heavy industries. Site plan flexibility—setbacks, clustering—may be proposed in exchange for development in this district. Site design, building architecture, and landscaping should be master-planned given its high visibility from State and Federal Highways and connections to them. Uses should be platted as a unified development on 20 acre parcels if practicable, but no less than 10 acres.
Commercial/Industrial	This category is intended to provide development opportunities for wholesaling, warehousing, transportation/distribution related uses, heavy commercial and industrial uses all which are fully indoor operations, with outside storage only permitted within fully-screened enclosures located in the rear or side lot areas. Uses shall be restricted to areas where a satisfactory correlation of factors such as adequate transportation facilities, accessibility for employees, efficient land assembly, adequate topographical conditions, and adequate provisions of public utilities required by industry may be achieved.

Other Land Uses

Commercial	This category includes activities such as retail sales and services, restaurants, office uses, general business services and small-scale convenience stores at key intersections only. Planned commercial developments should be considered where areas to be developed are near a residential area or other natural/sensitive use. The scale and character of Commercial development should be compatible with the surrounding uses. Detailed architectural, urban design, and landscape plans will be required to ensure neighborhood character is maintained. Access control, additional landscaping, buffering, and monument signage is required when appropriate. Public uses and services allowed in these districts should promote the retail capacity of the area.
Industrial	This category is for light and heavy industrial uses, distribution and warehouse developments. The district is designed to accommodate the widest range of industries including conventional light or heavy industries. Higher standards should be considered for heavy industries in terms of screening and buffering, and in terms of regulatory review, such as special use permit requirements.
Park/Open Space	Active and passive public parks and open space corridors with public access; also include FEMA designated floodplain, designated wetlands, natural prairie grassland areas, drainage areas, and any other lands reserved for open space purposes.

Long-term Development	This area has been specially assigned this category because at the time of this study, although there are no current development plans in this area, it is large and significant enough that it should be preserved for a higher and better use, should infrastructure be built in the future. In order to accommodate large scale development of this magnitude, properties should not be allowed to be subdivided without an approved master development plan for the entire area.

The Future Land Use map shows the designation of the above uses within the City primarily based on existing land uses and existing zoning; and in its "Planning Area" based on land use projections and generally accepted planning principles and policies. The land use policies reflected in the Future Land Use map are summarized on the following pages.

MIXED USE/BUSINESS PARK LAND USE POLICIES

The I-35 corridor around east and south Ottawa is the city's "front door" to travelers. Promoting quality design, and encouraging landscaping and appropriate screening from the roadway and adjacent land uses is one policy of the Plan. A shift from a corridor which is strictly segmented by zoning—retail, or office or industrial—to a corridor with mixed uses is another policy that the Plan promotes in order to create flexibility in local development review and approval.

I-35 Corridor Overlay District

This requires an examination of land use/market demand, traffic effects, fiscal impacts and infrastructure demand/constraints. Land use compatibility is a primary concern, as is controlling traffic. The city should develop and adopt an overlay district tailored to the corridor. This overlay would apply to all properties along I-35 within a mixed use district and would supplement existing development codes. The mixed use development scenario is presented as a recommended development plan for the I-35 corridor in order to:

- promote quality design in high-visibility locations of Ottawa along the interstate, and
- target large acreages for large-scale, mixed use developments that create flexibility in site design.

Acceptable land uses include:

- industrial parks, office parks,
- business parks, and
- mixed use developments.

To provide a basic understanding of these terms, the Urban Land Institute provides appropriate definitions:

Industrial Park: An organized or planned industrial district is a tract of land which is subdivided and developed according to a master site plan for the use of a community of industries, with streets, rail lead tracks and utilities installed before sites are sold to prospective occupants.

Office Park: A development on a tract of land that contains a number of separate office buildings and supporting uses and open space that is planned, designed, built and managed on an integrated and coordinated basis.

Business Park: Includes a combination of office and industrial uses based on function, activity and appearance, based on the multi-use character of industrial parks and to de-emphasize physical industrial characteristics. Business parks typically require high visibility from major transportation routes and are set on large parcels with a high level of landscaping and site design. They generally avoid locations with significant retail development and attendant traffic congestion. An example of such a facility would be a campus-like corporate headquarters facility with the possibility of some adjacent production or warehousing functions, hotels, and some business service commercial (e.g., copy shops, travel agencies).

Land Use Issues. To ensure that future uses in the area are compatible with the mixed use concept and avoid interfering with existing industrial uses, the city should consider including the following features in a new overlay district. Key land uses should present a high quality image at key gateways to the city. The following land use patterns are key elements of the I-35 corridor mixed use scenario:

- On the west side of I-35 mixed use commercial and residential development, lodging, and service-commercial developments are anticipated, as well as large-land area retail uses that generate relatively light traffic, such as auto dealerships.

- Mixed Use and Business Park development is indicated east of Interstate 35, along K-68 Highway as an extension of the Wal-Mart Distribution Center district. The Mixed Use development anticipated East of I-35 is similar to that anticipated west of I-35. The land use policy for Business Park development intends to:
    - Promote attractive site design in high-visibility areas along the interstate corridor; and
    - Create an alternative campus area for office-commercial and non-manufacturing industry.

- Service commercial uses, such as auto dealerships, would be allowed with additional use restrictions to maintain quality image; and no business activities involving outdoor storage of construction equipment, materials and supplies.

- Certain retail commercial uses, such as restaurants, should be allowed as accessory uses within principal uses in support of surrounding service-commercial and business park uses, not in service to a regional market.

Parcel Size Issues. To ensure that parcels in the corridor are not split up into small lots and developed piecemeal, the city should consider requiring that developments be of a minimum site size (e.g., 5 acres). Such an approach will help ensure that developments relate well to one another, that access is efficient, and that development quality is relatively uniform throughout the corridor.

Design Issues. Quality of new development in the corridor is a critical concern if the city is to foster attractive mixed use development in the corridor. Important factors to be considered include:

- Parking location—some jurisdictions limit the amount of parking in front of primary facade to avoid the appearance of seas of parking along a main thoroughfare.

- Building facade treatment—standards should be adopted requiring that the facades of all buildings receive some treatment to avoid long expanses of blank walls. Rear/side walls should also have some detailing.

- Building materials—to ensure high-quality building materials compatible with a mixed use development area, the city should consider forbidding certain materials such as unarticulated facades of metal buildings.

Development Design/Regulatory Issues. Concerning compatibility, the mixed use developments should be subjected to newly updated site plan review standards and procedures, and new regulatory standards. From an administrative perspective, the county and city need to consider the question whether county zoning designation of standard commercial use continues to make sense. The key question facing the city is what changes are needed in development codes to accommodate mixed use and business park development in the corridor.

These issues raise questions related to allowable uses, controls on particular uses, minimum site sizes, access/linkages with adjacent development, and design (landscaping, signage, buildings, etc.). The city should continually update its site plan review standards to assure development is applied in a uniform and thorough manner along the corridor, including:

- Mixed use developments in the corridor would be subject to performance standards linked to measurable impacts, for example, traffic impact.

- Parcel sizes should be a minimum site size (e.g., 5 acres). Such an approach will help ensure that developments relate well to one another, that access is efficient, and that development quality is relatively uniform throughout the corridor.

Development Code Revisions. The city should update its site plan review process for all proposed developments in the I-35 corridor, particularly for three new Future Land Use designations:

- Mixed Use;
- Business Park; and
- Commercial/Residential.

All developments would be required to submit site plans to the appropriate review body which would enable the city to determine whether overlay development standards were met. Updated site plan review processes in Ottawa will ensure adherence to new development standards. Because of the unique nature of the I-35 corridor—given its high visibility in the interstate area—the City seeks to ensure high-quality mixed use development. These changes relate to:

- allowable uses,
- minimum parcel size requirements,
- access control, and
- site design.

LOCAL ARTERIAL ROAD LAND USE POLICIES

The local arterial road corridors in and around north and south Ottawa are key gateways to the city:

- The 23rd Street corridor that intersects with Main Street north of the U.S. 59 Highway and I-35 interchange, and, Eisenhower just north of the I-35/Old Highway 50 interchange;
- The north Main Street gateways along the corridor in the downtown and at the north entrance to the city;
- The gateway at Davis/Montana Road and the U.S. 59 bypass to I-35 north of the city; and,
- Intersection of 15th Street and I-35.
- Intersection of Eisenhower Ave. and I-35.
- Intersection of Eisenhower Ave. and 7th Street/K-68.

Local Arterial Road Corridor Overlay Districts

The local arterial roads leading to the city form "corridors" that lead from the gateways to the City. Visitors enter and leave along these corridors. Promoting quality design, and encouraging proper access control are key objectives that may be furthered through "Local Arterial Road Corridor Overlay Districts." Rather than regional traffic controls, however, these local arterial road corridors require local controls and land use measures that are responsive to slower travel speeds, for example.

Land Use Issues. The local arterial road corridors should be protected from land use incompatibilities through careful site design standards. The following land use patterns are key elements of the local arterial road corridors:

- Developments in the corridors would be subject to performance standards linked to local traffic and access control standards to ensure good traffic flow.
- Enhanced landscaping and buffering standards would apply to ensure attractive corridor development and compatibility with neighboring residential districts.
- Gateway features would be encouraged and secured through site plan review.

Design Issues. Quality of new development in the local arterial road corridors should consider:

- Building orientation/setbacks—require primary entrances of buildings to front on the major thoroughfare in an area to avoid haphazard site development patterns. All developments in the corridor should be required to face the main road. Also, special minimum/maximum setback standards should be considered to avoid inconsistent building placement along the corridor.
- Landscape requirements--Perimeter and parking lot landscaping requirements need to be increased. For example, trees should be required to be planted along the frontage of major roads such as I-35, K-68, Eisenhower Avenue and 23rd Street, and parking lots should have interior planting islands.
- Signage controls—all signs in the K-68 and 23rd Street corridors should be ground-mounted monument signage limited in size. Each site with multiple uses should develop a master sign plan for review during the site planning process. Large on premise pole signs would only be allowed if site adjacent to I-35 corridor. Off-premise signs (billboards) would be restricted to adjacent to the I-35 corridor and no closer than governing zoning regulations.
- Service facilities/loading areas—the city should adopt special standards for placement and screening of trash receptacles, loading areas, and other service facilities.

Development Design/Regulatory Issues. Concerning compatibility, the arterial road developments should be subjected to new regulatory standards:

- Access management standards for drive and intersection separation;
- Traffic controls such as median-divided access; and
- Enhanced buffering and screening standards when adjacent to residential districts.

Development Code Revisions. The city is updating its zoning ordinance to establish new landscaping requirements in local arterial road corridor overlay districts. New access control requirements should be added, as well.

RETAIL AND INDUSTRIAL LAND USE POLICIES

Retail-commercial uses are at the I-35 highway interchanges with K-68 Highway and US 59 Highway, as well as along Main Street. Commercial/Residential Mixed Density and Mixed Use districts are proposed in close proximity to employment opportunities near designated non-

residential development along the highway corridors. These higher intensity residential uses provide a transition between the non-residential use and the low density residential uses.
These distributions build on smart growth principles by providing opportunities for alternative transportation (residential uses within walking distance of work and services). The recommended land use distributions also provide the greatest opportunities for transitions between higher-intensity uses along the highway corridor to lower-intensity uses stepping away from the corridor. Most importantly, the mixed use category promotes land use connectivity, shared parking, and related aspects of inter-relating land uses—a development principle directly relevant to an urbanizing corridor.

Industrial uses are primarily focused in the northeast quadrant of the city, along Davis Avenue, Industrial Road, Enterprise Avenue, and North Street. There are several other industrial areas within the city that are smaller, with the largest of these being the W. Wilson Street area. Identified as developed industrial sites in the planning area would include East of I-35/K-68, south of Osborne Terrace, West of I-35/K-68, and undeveloped area north of the airport.

Industrial uses clustered around the railroad and Davis Avenue provide adequate local and regional access and build upon the existing pattern of industrial development. This location also allows industrial uses to develop in close proximity to existing rail lines and highway access. With the future connection of Interstate 35 and US 59 Highway, this location could also be immensely benefited from improved access.

RESIDENTIAL LAND USE POLICIES

Essentially, the City of Ottawa needs to agree on how to implement two new residential policies:

- Accommodate higher density residential development, including mixed use development; and,
- Foster affordable housing. Ottawa has a disproportionately high percentage of non-resident workers. The city needs to study the reasons for this and weigh options such as developer incentives and tax credits to encourage building of affordable homes within city limits.

Higher Density and Multifamily Housing Policies

The City needs to encourage higher-density and multifamily housing options as a way of filling in market niche for different housing options. The Future Land Use Map shows the areas that will be encouraged for higher-density and multifamily housing.

- Along Davis Avenue, next to the proposed new school site. Also as a buffer between low-density residential and non-residential uses.
- Along Eisenhower Avenue
- As infill development in older areas of Ottawa
- As Planned Unit Developments in newer parts of Ottawa
- As part of mixed use developments.

GATEWAY CONCEPTS

Several key intersections and corridors within Ottawa serve as a primary means of access to the community. Thus, these intersections and the activities surrounding them are often a visitor's first impression of the City. These key intersections and corridors will function as "gateways" into Ottawa. These gateways not only influence visitors' perceptions, but can also help promote the quality of life and vitality of the community with Ottawa residents. As such, special attention and planning consideration should be given to these locations.

The planning and design considerations given to gateways should be based on a hierarchy of importance, based on purpose, location, traffic volumes, street function and visibility. Gateways should be identified as primary, secondary and transition gateways.

Gateways. Gateways should identify the City of Ottawa as a whole. Primary gateways should be located at the entrances to the City along major arterial roadways such as at the interchanges with I-35 and at entrances to the City along 68 Highway and 59 Highway. In addition, those portions of the above-mentioned roadways leading into Ottawa should be considered part of the primary gateways. Secondary gateways may include some features listed below:

- Prominent features such as public art, statuary, fountains, gardens or park-like settings;
- Signage to clearly identify entrance into Ottawa. Brick, stone or other high-quality materials and the city logo should be incorporated into the signage to further establish the gateway;
- Landscaping to accent the surrounding corridor and prominent features. A combination of street trees, ornamental trees, shrubbery, ground covers and ornamental plantings should be used to accent and coordinate the design; and,
- Benches, trash receptacles, pedestrian scale lighting, unique paving patterns at crosswalks, and other streetscape elements.

Transition Gateways. Transition gateways are identified for those areas where a distinct change in activity or land use takes place or a specific district begins along an arterial or collector roadway. Transition gateways are used to identify the entrance into unique destinations or corridors; for example, the entrances into downtown along Main Street and the area around Ottawa University. These gateways are also appropriate for transitions such as those between residential and commercial uses.

Transition gateway features are on a smaller scale than primary or secondary gateways. The major features of the transition gateways are:

- Signage to clearly identify the entrances into the unique district;
- Landscaping to accent the streetscape and signage. A combination of street trees, ornamental trees, shrubbery, ground covers and ornamental plantings should be used to accent and coordinate the design;

- Benches, trash receptacles, pedestrian scale lighting, small-scale art, unique paving patterns at crosswalks, and other streetscape elements; and,
- Items that carry or perpetuate a theme throughout the area so as to add and define the areas identity.

Figure 4.2: Transitional Gateway Signage Feature

Monument signs or other unique gateway features can announce the entrance into unique districts such as Ottawa's Central Business District.

The City should work closely or partner with Ottawa Main Street Organization and local developers to ensure that adequate aesthetic considerations are given to development near identified gateway locations. As part of the review process, the City should consider the visual impacts of development at these locations. Development should incorporate architectural features such as building recession and projections, canopies and awnings, windows, and high-quality materials to accent and complement the gateway development. Building orientation and parking should also be carefully planned to minimize the adverse impacts of the negative features of the site. Trash dumpsters, loading areas and parking should be screened with appropriate landscaping.

Because gateways in Ottawa are largely undeveloped, the city should partner with the private sector developers and incorporate gateway improvements during site plan review.

PARKS AND RECREATION PLAN

The Comprehensive Plan should guide the City in ensuring that adequate parkland and facilities are provided as a result of new development. The National Recreation and Park Association's (NRPA), "Recreation, Park and Open Space Standards and Guidelines," (1981 and revised in 1990 and 1995) are the most widely accepted guidelines. These standards became nationally

accepted for determining appropriate levels of the various elements that comprise an open space system.

The Ottawa recreation Commission addresses recreation activities and programming in Ottawa. Administration of the programs is funded through fees and a 0.5 mill levy in the City of Ottawa. The Commission recently adopted a recreation master plan, and is currently in planning and design for a new recreation center, to be located on donated USD 290 property near Eisenhower Elementary School.

The City of Ottawa is currently served by seven parks, which are described in detail in **Chapter 2: Existing Conditions and Demographics.** The parks have been classified in the following table, based on NRPA standards and how the Ottawa community uses the parks. In addition, the existing school grounds also serve as neighborhood parks.

Mini Parks	▪ Haley Park
Neighborhood Parks	▪ Heritage Park ▪ Freedom Park
Community Parks	▪ Cox Field ▪ Kanza Park ▪ City Park
Regional Park	▪ Forest Park
Trails	▪ The Prairie Spirit Rail Trail ▪ Kanza Rail-Trail Conservatory Park

The Future Land Use Map identifies a couple of locations for future parks in the city (ref. Map 7)

- A neighborhood park along Nugent Creek, east or west of Eisenhower Avenue.
- A neighborhood park, north of K-68, near the proposed new school and tourism center
- An extension of Forest park to the northwest
- An extension of Orlis Cox fields
- A neighborhood park on East 15th Street, north of street, east of city limits
- A southern trailhead/neighborhood park south of city limits on Highway 59, west side

TRANSPORTATION MASTER PLAN

One of the essential elements of a community is its public transportation network. It provides a means for transporting people, goods and services within the community and the region. Ottawa enjoys the advantage of its strategic location on the major trafficways that include Interstate 35,

U.S. 59 Highway and K-68. These have helped shape the traffic network of Ottawa. The City has developed a thorough Transportation Study and Master Plan, which was adopted in 2008.

The Transportation Master Plan outlined in this section identifies the projected major street network, including various highways and major roadways within the City. The completion of local and regional connections within and throughout the City is critical to the future success of Ottawa. Individual roads and streets do not serve trips independently; rather, most trips involve movement through a network of roadways. A functional classification system of roadways provides a method for channeling traffic in a logical, efficient and safe manner.

The Transportation Master Plan represents the existing transportation system in Ottawa and recommends an update to the street classification system (Ref. Map 6), along with changes to the typical roadway cross sections and expansion of the Urban Growth Area to include the new US 59 / I-35 interchange. In order to help ensure that the City's road network is complete and adequate to serve the community, the City has enforced a policy of requiring road construction in conjunction with approved development. The City's current policy is to require development to construct the required local roads.

During the 90's a concentrated effort was undertaken to improve gravel roads to either asphalt or concrete surface with curb and gutter sections. The city partnered with the adjacent owners through benefit districts and removed nearly three miles of gravel roads. Approximately seven miles remain unimproved. This issue continues to be addressed whenever possible and solutions will be identified as development occurs or funding sources are identified.

Ottawa Functional Street Classification

The existing road and highway network is classified by function. Roads and highways are grouped into classes or systems according to the service they provide. Streets are considered local, as distinct from regional roadways and highways. Factors that identify roadway classifications are the level of through-traffic movement and access to adjacent land or individual properties.

Expressways

Ottawa enjoys an advantage of being directly served by Interstate Highway 35, a major expressway between Kansas City and Wichita. This highway provides Ottawa' businesses and residents a convenient access to major portions of the two Metro areas.

Arterials

The designated arterial streets in Ottawa have been significant traffic carriers that are the backbone of the City's transportation system. They provide linkages between different parts of the City as well as between the City and adjacent communities. These arterial streets are listed in **table 4.5**.

U .S. 59 is an important link between Ottawa and Lawrence, and is the main north/south arterial in the City. The Kansas Department of Transportation (KDOT) and the Federal Highway Administration (FHWA) are planning to improve highway safety and capacity along U.S. Highway 59 between Lawrence and Ottawa. The improvement under design is to construct a new four-lane highway between the two cities. At the southern terminus, the proposed roadway would tie into the existing two-lane U.S. Highway 59 north of Ottawa and connect I-35 northeast of Ottawa. The northern terminus of the roadway would connect to the existing four-lane divided expressway approximately 1.5 miles south of Lawrence. The alignment under design is shown in **Map 6.**

K-68 provides the major east-west arterial connection in the City. The 1998 K-68 Corridor Management Study proposed the long-range need to develop parallel access roads. Davis Avenue/Montana Road will need to be improved to arterial status to handle increased traffic flow; one-half mile roads should be improved to collector status; areas south of K-68 will probably continue to develop as residential, therefore the only south road improvements will be to create local and collector streets that connect with K-68.

Table 4.5: Existing Arterials Serving Ottawa

Name	Direction	From	To
US 59 Highway	N-S	North City Limits	Interstate-35
K-68 Highway	E-W	West City Limits	Davis Street
Davis Street	N-S	K-68	City Limits
2nd Street	E-W	Beech Street	Main Street
7th Street	E-W	West City Limits	Cedar Street
15th Street	E-W	West City Limits	East City Limits
Cedar Street	N-S	1st Street	15th Street
Wilson Street	E-W	Main Street	Davis Street
Eisenhower Rd.	N-S	K-68	I-35
1st	E-W	Main	Cedar
Ash	N-S	2nd	15th
23rd	E-W	Princeton St.	Eisenhower Rd.

Figure 4.3: Typical Cross Section for Arterial Streets

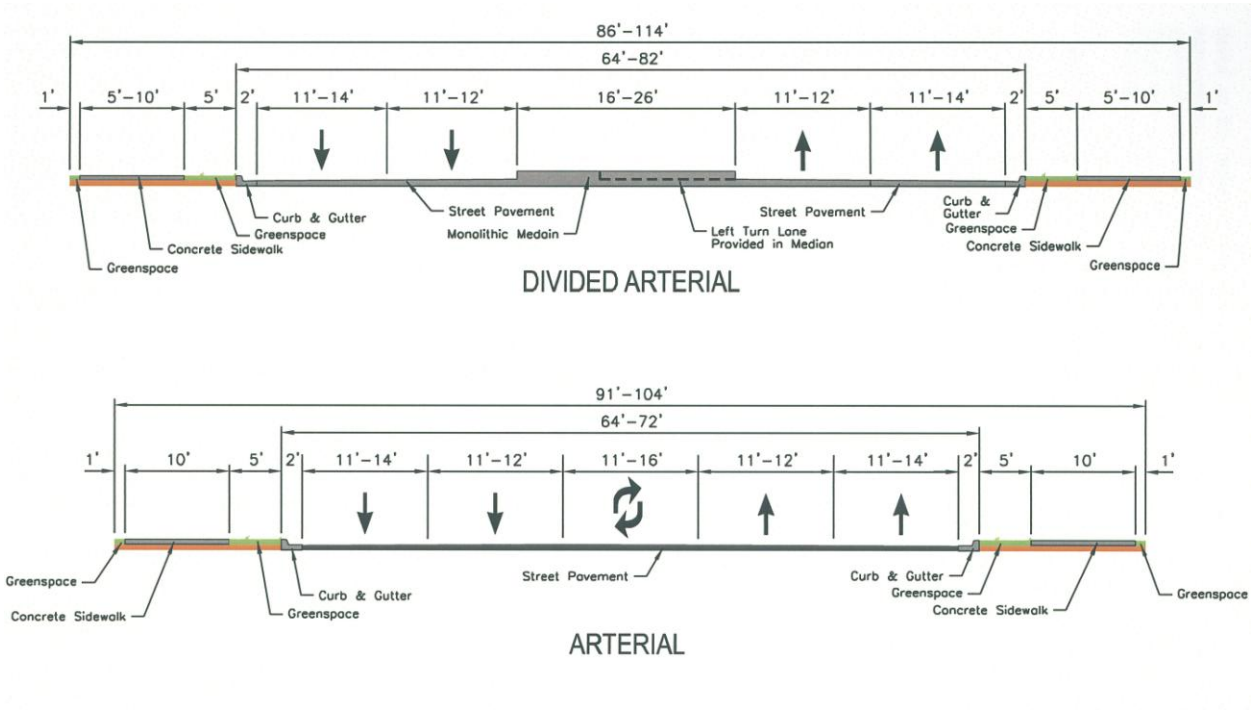


Table 4.6: Arterial Improvements and Extensions

Name	Direction	From	To
US 59 Highway	N-S	North City Limits	Riley Rd.
Montana Rd.	N-S	North City Limits	Riley Rd.
K-68 Highway	E-W	East City Limits	Ohio Rd.
US 59 Highway	N-S	South City Limits	Jackson Rd.
Marshall Rd.	E-W	East City Limits	I-35
Sand Creek Rd.	E-W	US 59 Highway	Nebraska Rd.
Nebraska Rd.	N-S	North / Pawnee	Reno Rd.
Reno Rd.	E-W	US 59 Highway	Nebraska
Montana Rd.	N-S	Interstate 35	Jackson Rd.
Kingman Rd.	E-W	Eisenhower Rd.	Montana Rd.
Rock Creek Rd.	E-W	Eisenhower Rd.	US 59 Highway
Old US 50	SW-NE	Rock Creek Rd.	Eisenhower Rd.
North / Pawnee	E-W	East City Limits	Nebraska Rd.

Generally, the minimum right-of-way requirement for arterials is 80-100 feet. The minimum pavement width is 48 feet from back to back of curbs which allows two moving lanes of 12 feet each in each direction (curb and gutter width included). Turning lanes may be used at major intersections. A 14 to 16 foot median or center lane may be used for some arterial streets. Parking is not allowed on either side of an arterial. A sidewalk of at least five feet wide should be

furnished on both sides of the roadway or a five-foot sidewalk should be furnished on one side and a ten-foot bikeway on the other side of the street.

As a general rule, traffic volumes on an arterial should be more than 9,000 vehicles per day or average daily trip (ADT) would trigger the designation of a road as arterial. However, traffic volume is only one factor. In Ottawa, as in other cities it's size, location of roads, existing traffic patterns, etc., help determine the functional classification. Arterials should be able to accommodate speeds up to (but not limited to) 35-45 mph depending on adjacent land uses. Arterials are usually spaced at approximately one mile intervals. However, there is no absolute spacing requirement since spacing should be the function of adjacent land use type and density.

Collector Streets

The existing collector streets are listed in the following table. These streets serve as the ribs of the City's transportation system.

Table 4.7: Collector Streets

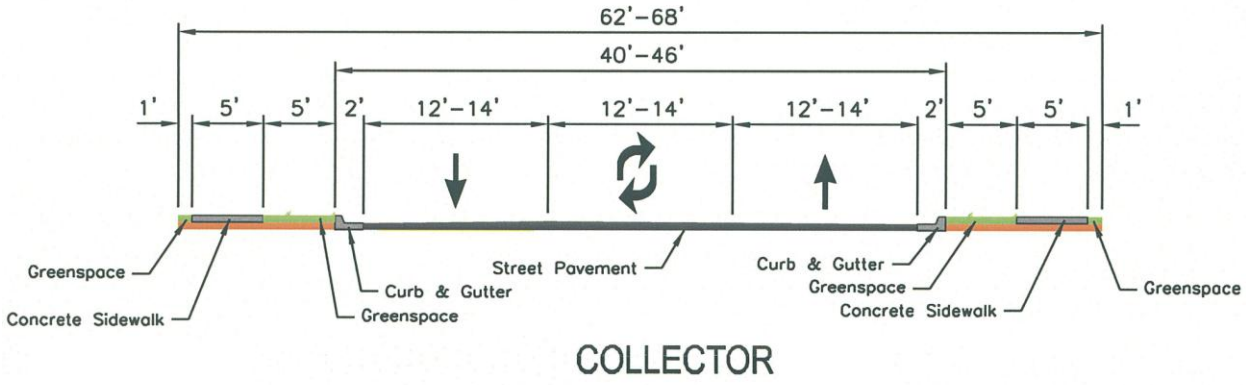
Name	Direction	From	To
North Street	E-W	Cherry Street	Davis Street
N. Cherry Street	N-S	Logan Street	North Street
Locust Street	N-S	Tecumseh Street	Wilson Street
Tecumseh Street	E-W	Main Street	Locust Street
1st Street	E-W	Main Street	Walnut Street
4th Street	E-W	Walnut Street	Cherry Street
Hickory Street	N-S	1st Street	5th Street
Walnut Street	N-S	1st Street	7th Street
5th Street	E-W	Hickory Street	Walnut Street
9th Street	E-W	Mulberry Street	Main Street
11th Street	E-W	Mulberry Street	Ash Street
Mulberry Street	N-S	7th Street	15th Street
Willow Street	N-S	7th Street	15th Street
Elm/Main Street	N-S	17th Street	23rd Street
19th Street	E-W	Elm Street	Eisenhower
S. Cherry Street	N-S	4th Street	7th Street
17th Street	E-W	Main Street	Eisenhower Street
Wilson Street	E-W	West City Limits	U.S 59 Highway
7th Street	E-W	Cedar Street	Lincoln Street
Lincoln Street	N-S	7th Street	15th Street
2nd Street	E-W	Main Street	Cedar Street

The design standards vary slightly for collector streets depending on whether bikeways are included. The right-of-way requirement for a collector street with a separated bikeway is 70 feet with a pavement width of 36 feet back to back of curbs. The pavement includes two moving lanes of 12 feet in each direction (a two-foot curb and gutter is included in each lane) and a turning lane of 12 feet. Parking is prohibited on either side of the roadway. A five-foot sidewalk should be furnished on one side and a ten-foot bikeway on the other side of the street.

Table 4.8: Collector Street Improvements and Extensions

Name	Direction	From	To
11th Street	E-W	Ash Street	Eisenhower
Osborne Terr.	E-W	East City Limits	New Road
New Road	E-W & N-S	Osborne Terr.	Nebraska Rd. (See Map)
Labette Rd.	E-W	Princeton St.	Montana
Jackson Rd.	E-W	Eisenhower Rd.	US 59 Highway
Eisenhower Rd.	N-S	Interstate 35	Jackson Rd.
Louisiana Rd.	N-S	Old US 50 Highway	Jackson Rd.
Montana Rd.	N-S	15th Street	Labette Rd.
Bennet / New Road	N-S	K-68	Osborne Rd.
Rock Creek Rd.	E-W	Louisiana Rd.	Eisenhower Rd.
Labette Rd.	E-W	Eisenhower Rd.	Kentucky Rd.
Louisiana Rd.	N-S	Marshall Rd.	Labette Rd.
Marshall Rd.	E-W	Louisiana Rd.	Eisenhower Rd.
Marshall Rd.	E-W	Interstate 35	Nebraska Rd.
Labette Rd.	E-W	Montana Rd.	Nebraska Rd.
Nebraska Rd.	N-S	Marshall Rd.	Labette Rd.

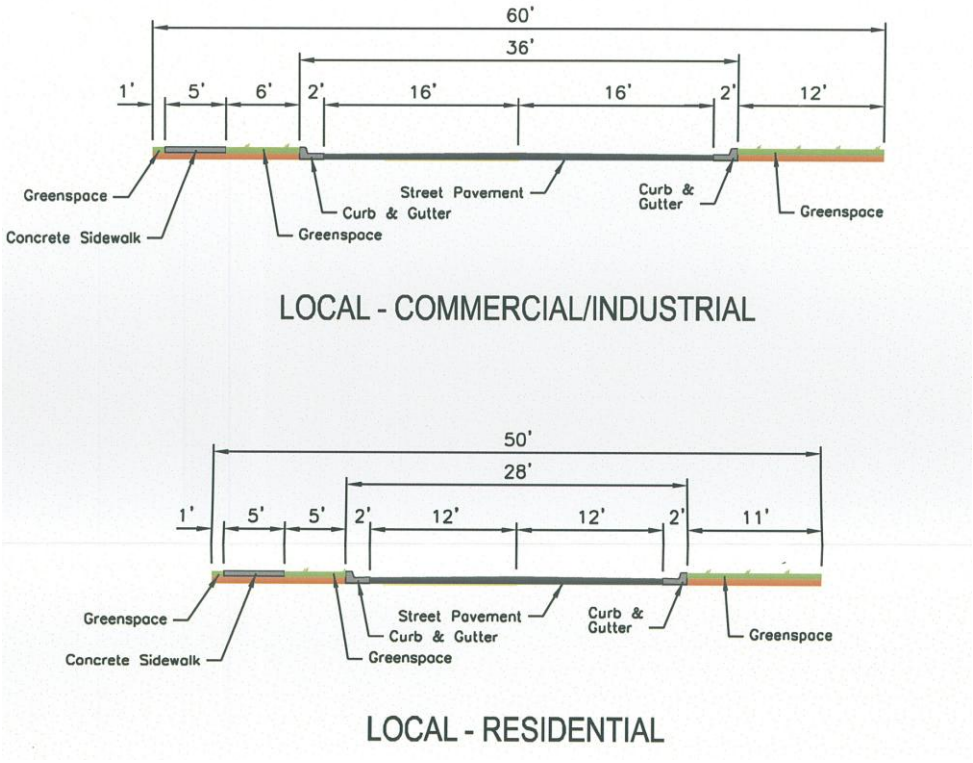
Figure 4.4: Typical Cross Section for Collector Streets



Local Residential Streets

All streets in Ottawa and its planning areas not designated as arterials and collectors are considered local residential streets or neighborhood streets. Most of these streets are generally adequate to serve access needs and are not discussed in detail in this section. In the growth areas local streets will be built on an as-needed basis.

Figure 4.5: Typical Cross Section for Local Streets



The right-of-way requirement for local streets is 50 feet. The pavement width should be 28 feet back to back of curbs that provides one lane of 12 feet in each direction (plus a two-foot curb and gutter on each side of the road). A sidewalk pavement of five feet should be furnished on one side of the street. Parking is normally allowed on one side of the street pavement. The traffic volumes for local streets should be less than 600 ADT. The speed on local streets should be 30 mph or less (**Table 4.9**). The Functional Street Classification and Design Standards that follows provide a summary of the street classification system and design standards. It should be pointed out that the classification system and design standards presented in this section of the Plan are intended to provide basic guidelines for evaluations of the City's current transportation system, for future street design and construction, and for future improvements of public streets.

They are not intended to cover every segment of the city streets. In many cases, detailed engineering studies are necessary to identify and evaluate every significant factor involved and to determine if these design standards apply. For example, in an already developed area, it may not be possible to acquire additional right-of-way necessary to meet the standards as specified for that street type.

Table 4.9: Summary of Functional Street Classification and Design Standards

	Rural Arterial	Urban Arterial	Rural Collector	Urban Collector	Local Comm./Ind	Local Resid.	Alley	Commercial Alleys
Number of lanes	2-5	2-5	2-3	2-3	2	2	N/A	N/A
ROW width	120'	100'	100'	80'	80'	60'	20'	25'
Pavement width*	28'+	28'+	28'+	28'+	25'+	23'+	20'	25'
Curb and gutter req.	No	Yes	No	Yes	Yes	Yes	No	No
Shoulder width	6'+	N/A	6'+	N/A	N/A	N/A	N/A	N/A
Sidewalk req.	Both sides	Both sides	Both sides	Both sides	Both sides	One side	N/A	N/A
Min. Sidewalk width	6'	6'	6'	6'	5'	5'	N/A	N/A
Bike Lanes (4' - Both sides)	No	No	Preferred	Preferred	No	No	N/A	N/A
Separate Bike Path (10')	Preferred	Preferred	No	No	No	No	N/A	N/A
Parking	No	No	No	No	TBD	One side**		N/A
Design Speed	40+	40+	30+	30+	30+	30+	20+	20
Driveways	No	No	No***	No***	Yes	Yes	N/A	N/A

Notes
*Width does not include curb and gutter
**Parking may be allowed on both sides if pavement width is 27'
***May be allowed if adequate justification is provided

Access Control

Just as the design of a roadway helps to move traffic efficiently, controlling access to the roadway system can help do the same. The lack of an adequate access control policy or plan increases the probability of having traffic hazards and increased traffic congestion. Traffic hazards and traffic congestion reduce the capacity of the roadway to accommodate the traffic volumes for which it is designed. Traffic congestion and traffic hazards increase the pressure to widen roadways which requires spending additional public funds.

Roadway capacity can be increased or decreased in a number of ways. The method utilized most frequently to increase capacity is to widen a road to provide additional travel lanes. In some instances, however, it is not feasible to add additional travel lanes due to abutting land uses on either side of existing roadways. In these instances, other methods of increasing roadway capacity may be more appropriate. Other methods include constructing intersection improvements, turn bays, medians, restricting road and driveway access or providing traffic signal timing improvements. Conversely, road capacity can be decreased by adding cross roads, driveways, traffic signals, or other traffic control devices. By developing an access control policy, road capacities can more adequately accommodate future development.

Specific design characteristics associated with each functional classification depend on factors such as projected traffic volumes and local access control policies. Higher traffic volumes, for example, those exceeding 20,000 vehicles per day, warrant construction of a four or five lane arterial road. Traffic volumes of 10,000 or 15,000 vehicles per day can be accommodated by a four-lane arterial road or by a two-lane arterial road which includes turn bays, good signal and

intersection spacing, and private driveway access control. In many cases, a well built two-lane arterial road can function as well as a four-lane road at approximately half the cost.

Acceptable traffic volumes on a major arterial roadway can range between 25,000 and 35,000 vehicles per day. This capacity, however, can be reduced by excessive curb cuts and mid-block turning movements. The center turn lane is appropriate because of frequent entrances into higher traffic generation land uses such as business parks and retail centers. A median can be constructed in locations where left-turns should be prohibited and on-street parking should not be allowed. For design speeds greater than 35 mph, or for peak hour right turn-in traffic volumes exceeding 100 vehicles, it is recommended that a right turn lane be constructed along the arterial roadway approaching the curb cut.

K-68 Access Control

K-68 provides regional access as well as access to abutting properties. Therefore, it is critical that a sound access control policy be followed as development occurs on property directly abutting the highway.

K-68 east of Interstate 35 (I-35) is a two-lane highway. KDOT replaced the two bridges on I-35 over K-68 in 2002. The entrance and exit ramps on I-35 were moved outward when the bridges were replaced. The relocation of the exit/entrance ramps cause a portion of Nebraska Road southeast of the interchange area to be relocated approximately 300 feet to the east. The relocation of Nebraska Road establishes a new access point on the south side of K-68. This allows for a future road extension to the north as such time that development occurs at that location.

K-68 west of I-35 has been improved to a four-lane divided highway. Therefore, it is capable of carrying a larger volume of traffic than K-68 east of I-35. According to KDOT 2000 Traffic Flow Map for the Kansas State Highway System, K-68 between the Ottawa corporate limits and I-35 carried an average daily traffic volume of 8,800 vehicles. Based upon the average daily traffic volume on K-68, there is sufficient excess capacity to accommodate traffic from future development in the study area.

As future development occurs, minor roadway improvements may be necessary to prevent traffic congestion from increased traffic movements on K-68. Such improvements may consist of turn bays, restricting road and driveway access, or providing traffic control devices. The need for these improvements must be carefully balanced against the need to allow for the efficient movement of traffic through the study area. Therefore, the carrying capacity of K-68 must be protected by limiting the number of cross roads, driveways, traffic signals, or other stop controls.

K-68 is maintained by the Kansas Department of Transportation (KDOT). Therefore, access control on K-68 is under the authority of KDOT. KDOT has developed and adopted the Corridor Management Policy which establishes criteria and procedures necessary to obtain reasonable access to K-68. In addition, KDOT can establish a district plan for the K-68 corridor. According

to the Corridor Management Policy a district plan represents a coordinated effort in the identification and management of high growth corridors and routes or segments of routes in need of a higher level of management. A district plan for the K-68 corridor should be developed as a partnering effort between KDOT, the City of Ottawa, and landowners within the corridor. Development of a district plan will help avoid traffic congestion, prevent loss of traffic carrying capacity and can help maintain the appropriate level of service on K-68.

When K-68 was improved to a four-lane divided highway from the Ottawa City limits to I-35, KDOT constructed future access locations along each side of the highway. The access locations are constructed approximately every 600 feet between Davis Avenue and the west exit/entrance ramp at the I-35/K-68 interchange.

Because K-68 is a major arterial roadway and the efficient movement of traffic is of primary importance, each of the access points existing should not be developed as such. Rather, roadway and driveway intersections on K-68 should be approximately 1320 feet or more apart. Each access point should allow access to multiple properties. Therefore, each access point should be developed as a public roadway rather than as a private driveway. By developing the access points as public roadways, these access points also will provide access to properties not directly abutting the highway. This in turn will help prevent traffic from being funneled to only a few roads within the study area, thereby increasing traffic congestion on selected roads.

Parallel Access Road System

In order to provide convenient access between properties along K-68, as well as to other properties within the study area, parallel access roads should be developed to the north and south of K-68. The parallel access roads should be located approximately one-eighth to one-quarter mile from K-68 and should generally be parallel to K-68. The parallel access roads will provide convenient access between neighboring properties without forcing traffic to access K-68. In order to form a complete road network, roadways should intersect each parallel access road and K-68 approximately every one-half mile. The parallel access roads, as well as intersecting roads, will function as collector roads and should be constructed to the applicable road standards. If, however, higher intensity development occurs along a parallel access road, the parallel access road may need to be constructed as an arterial roadway. Development of a parallel access road system should be done in concert with the KDOT, as KDOT establishes the access control along K-68.

Access Control for Arterial and Collector Roadways

In addition to an access control policy for K-68, an access control policy should be developed for other roadways within the study area. The following describes specific access control guidelines for roadways other than K-68.

Intersection Spacing: Adequate distance between intersections is essential for the safe and efficient flow of traffic. Appropriately spaced intersections provide through-motorists an

opportunity to respond to traffic entering the road from a side road. **Table 4.10** shows the minimum standards for spacing intersections, determined by through-traffic speed.

Table 4.10: Minimum Intersection Spacing Standards

Through-Traffic Speed	Minimum Intersection Spacing
30 mph	210 feet
35 mph	300 feet
40 mph	420 feet
45+ mph	550 feet

Source: Institute of Transportation Engineers

Driveway Spacing: Like a roadway, private driveways create an intersection with a public street. Conflicts and potential congestion occur at all intersections - public and private. Methods to reduce conflict include:

- Separating the conflicts by reducing the number of driveways and intersections;
- Limiting certain maneuvers such as left turns; and
- Separating conflicts by providing turn lanes.

No access drives should be located within the operations area of an intersection. Driver conflicts need to be spaced in order to eliminate overlaps between through traffic and right turns.

It is recommended that driveway locations, at a minimum, should comply with the corner clearance criteria indicated in **Figure 4.6.** Proper spacing of driveways permits adequate storage and stacking of automobiles on the public street. This distance may have to be increased in cases with high volumes to ensure that driveways do not interfere with the operation of turning lanes at intersections.

The number of driveways accessing undivided arterial roadways should be minimized if not completely avoided. In order to do so, **Table 4.11** provides driveway spacing guidelines that should be used as development occurs along undivided arterial roadways. The driveway spacing guidelines provided in **Table 4.11** are based on AASHTO and the Institute of Transportation Engineers (ITE) guidelines.

Table 4.11: Driveway Spacing Guidelines

Maximum Number of Driveways	Driveway Spacing	
	Undivided Arterial Roads Length of Lot Frontage	Divided Arterial Roads Length of Lot Frontage
1	0-399 feet	0-529 feet
2	400 - 899 feet	530 - 1199 feet
3	900-1,399 feet	1200 - 1859 feet
4	1,400-1,899 feet [1]	1860 - 2525 feet [2]

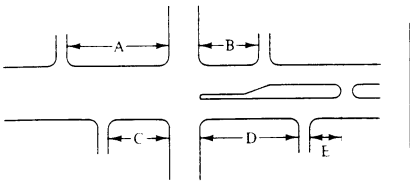
Source: Bucher, Willis & Ratliff Corporation Notes:

[1] For each 500 feet above 1899 feet, one additional driveway is permitted.

[2] For each 665 feet above 2525 feet, one additional driveway is permitted.

Corner Clearance: Specific minimum corner clearance guidelines are listed in **Figure 4.6**. These guidelines can be used to regulate new developments which often are located along arterial or collector roads.

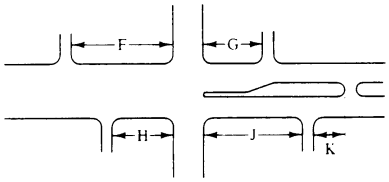
Figure 4.6: Corner Clearance Guidelines



Minimum Corner Clearances*

Item	Functional Classification of Road		
	Arterial	Collector	Local
A	230	175	50
B	115	85	50
C	230	175	50
D	230	175	50
E	75	0	0

(a) Signalized intersection control



Minimum Corner Clearances*

Item	Functional Classification of Road		
	Arterial	Collector	Local
F	115	75	50
G	115	85	50
H	85	85	50
J	115	75	50
K	75	0	0

(b) Non-signalized intersection control

PEDESTRIAN AND BICYCLE PLANNING

Like the need for roadways to serve vehicular traffic, the City has made substantial investments in infrastructure to serve pedestrian traffic. As with most cities, Ottawa's sidewalk network is incomplete. In an effort to complete the sidewalk network, the City requires approved development to include construction of sidewalks on one side of local streets and both sides of collector and arterials since 1996. In existing areas, the City has worked to address both deteriorating sidewalks and areas that were not served with sidewalks in the last decades. In areas where the sidewalk existed but needed to be replaced, the city took applications to replace the sidewalk, with the owner paying only 25% of the cost and the city overseeing the contract. In areas with no sidewalk, the property owner had to pay 50% of the construction costs and again the city hired the contractor.

In recent years there have been numerous grant proposals to fund infrastructure improvements submitted to foundations and state agencies. These include development of a Safe Routes to School (SR2S) Plan, along with CDBG, KDOT, Sunflower Foundation and federal economic stimulus funding proposals. The SR2S plan recommended sidewalk improvements in area near elementary schools including Ash Street between Ninth and Eleventh Streets, North Cherry Street, and Fifteenth Street. The plan also recommends a variety of education and safety programs. A proposal to the Sunflower Foundation to fund a walking trail near Eisenhower Elementary School was approved in 2009, with project construction occurring in 2010. Other proposals include connection between the Prairie Spirit Rail Trail (PSRT) and commercial uses

along Princeton Street, and a connection along the Flint Hills Nature Trail from the PSRT to don Woodward Center. Lighting improvements to the PSRT have also been funded.

UTILITIES PLANNING UPDATES AND EXTENSION OF INFRASTRUCTURE

Water Services

Based upon the results of the distribution system hydraulic analyses, recommended system improvements were identified to reinforce the existing system and extension options in the 1993 Master Plan done by Black and Veatch and updated by Professional Engineering Consulting in 2002. Water supply, treatment, and high service pumping facilities are adequate to meet future requirements for the ultimate development considered. However, distribution system modifications were deemed necessary to serve the growth anticipated.

Using the assumption both existing elevated tanks are depleted to half-full to satisfy peak water demands, it was determined that booster pumping would be required to maintain residual pressures. To serve the high ground in the southwest vicinity of I-35 and Eisenhower, booster pumping would be required. Extensions of the existing distribution system can accommodate growth to the north and south between 15th and 23rd Street on the west side. To meet demands in the north and northeast part of the city, a new 16" transmission line was recommended between an existing 16" main near the treatment plant and Cedar Street and some stages of this construction is underway. To meet needs for system reliability, an existing 12" main on 15th was extended between Cedar and Mulberry and in the future will extend between Apple Lane and Lincoln. An existing 8" main on 7th Street from Walnut to Main should also be extended. To aid low-pressure issues in certain areas and to improve fire flows, four" mains should be tied to adjacent parallel larger mains. All future mains should be at least six inches for residential areas and eight inches in commercial or industrial areas. The need for these improvements is addressed in the annual budgeting process and as opportunity arises.

Wastewater Services

Since the early 1990s, it has been clear that in many areas of the wastewater collection system are overloaded during a 10-year storm event. Although removal of infiltration and inflow sources enabled some reduction in the problems, it was clear that a major expenditure of funds would be necessary to meet then current and future needs. The city has constructed a new wastewater treatment facility alongside the previous facility on East First Street.

The new facility is an oxidation ditch system with a treatment capacity of 2.6 million gallon per day (MGD) doubling the current capacity. The new plant was designed so that it may be expanded by another 50% in the future and this facility will meet all current state and federal regulations. Provisions have also been made for future regulations that may require the removal of phosphorous and nitrogen. The facility includes a complete de-watering system to ensure the economic removal of sludge produced by the plant. An odor control system is included, as is an ultraviolet cleaning system. The construction also includes upgrades to the

gravity flow interceptors in the area near the plant. These new and larger lines will help to eliminate a portion of the overloaded system during peak rainfalls.

In addition, several gravity sewers and lift stations were proposed to serve potential growth areas. In order to serve the growth area along Eisenhower and 19th Street, a lift station was installed in 2000 and currently sanitary sewer improvements are planned for 23rd Street, east of Eisenhower. In 1999, a lift station was installed along K-68/Logan to enable growth in that area. In addition, an evaluation of the north watershed pumping stations was conducted. It is comprised of the Logan, Riverlift, and Mulberry stations, and they have been well maintained and are in good condition. They do have needs for roof repair/replacement, electrical supply/motor control systems, and mechanical/ventilations upgrades in the near future. Upgrades to these pump stations and others, additional force mains, and rerouting of mains will also be necessary and will provide for the growth Ottawa is experiencing and expects. The Sanitary Sewer System Master Plan Update completed in March 2008 found that, although the inflow and infiltration program has reduced the amount of rain and ground water entering the system, many of the flow basins still have excessive infiltration and the many of the main sewers in the City's system are too small to carry the extra flows that follow rainfall events.

Electric Distribution, Power Plant and Substation

The City of Ottawa completed an Electrical System Master Plan in 2002 with the document created by Professional Engineering Consultants (PEC). Along with city staff, PEC developed a forecast of both peak demand and annual energy requirements for twenty years. Utilizing historical data collected during the years 1978 – 2001, along with staff input, the forecasts were developed. The projections indicate that future peak demand will be at 150% of current values by the year 2013, and double the current demand by 2021. At this level, significant enhancements and investments to the existing generating capacity, power contracts, and distribution system are required.

The study also concluded that improvements were needed to the distribution system. Improvements include splitting circuits, for both reliability and safety of personnel working on the system and to provide for growth. In order to address future load growth and redundancy, it was recommended that a substation be installed in the southeast portion of the city, which is currently in the development stages. Another substation was also recommended for the northeast part of Ottawa

The City of Ottawa operates the power plant as a peaking plant for summer loads for about four to five months each year. Evaluation of the existing generators, total operating hours, and maintenance concluded that more maintenance funds and personnel would be necessary to continue life expectancies and prevent peak season overtime problems. Again, the need for substations was revealed to be a significant issue for this area.

The study also created short and long term priorities. Since the study, staff and budgets have clarified these goals. Some items, such as splitting a circuit and addition of a bay at the plant,

have already been completed, but there are significant items to address over the next ten years. Currently, the goals are as follows:

- Construct the Southeast Substation – Complete May 2004
- Distribution System Modifications – 2004-2005
- Construct Generation – Phase 1
- Overhaul STAG Boiler or Convert to Peak Unit
- Construct Northeast Substation
- Construct Generation – Phase 2

These goals may be changed or the dates altered depending upon local growth in a particular area or the growth rate change.

Additional study of the 12 electric distribution circuits was completed in 2008. Recommended improvements, many of which have been completed, include conversion of circuits #4 and #8 from 4.16kv to 12.47kv, construction of a 161kv transmission line and 12.4kv substation in the NE Industrial park, and extension of power to the growth area south of Interstate 35.

Stormwater Management

The City is affected by floodplains of area rivers and creeks. The watershed of the Marais des Cygnes River drains east. Growth in the area north of K-68 will result in drainage concerns for conveying stormwater runoff to the river. Existing culverts under K-68 are sized primarily to convey runoff from existing agriculture land conditions. Increased runoff will not pass through the existing culverts and drainage channels. Development north of K-68 should include stormwater retention/detention or management facilities. The existing industrial park is located on a very flat terrain and rains result in localized flooding.

In June 2007 the City of Ottawa completed a Storm Water Master Plan, a summary of which is being included into the City's Comprehensive Plan. The master plan was to meet the criteria of the National Pollution Discharge Elimination System (NPDES) Phase II requirements established for all small municipalities. The study identified the following six objectives for the storm water management program:

- Manage the storm water holistically as complete watershed systems.
- Manage the storm water runoff to preserve, and even enhance, water quality.
- Manage storm water runoff and have programs to meet the requirements of the Federal National Pollution Discharge Elimination System (NPDES) Phase II and the Total Maximum Daily Load (TMDL) programs.
- Manage storm water to protect, and possibly restore, natural areas valued by the citizens of Ottawa.
- Develop a program with community participation and support.
- Provide a funding source to support a staff dedicated to the operation, maintenance, and management of the storm water system and provide the necessary public education.

In addition, the City adopted a Stormwater Management chapter to the Municipal Code in the Fall of 2011. The chapter helps the City further achieve the requirements of the NPDES Phase II program by implementing controls for illicit discharges, construction site erosion, and post-construction management.
(Stormwater Management revised 11-16-11)

Stream Buffer Requirements

Headwater streams are often severely degraded by urbanization and intense agricultural practices. As a consequence, many communities have adopted stream buffer requirements as part of an overall urban watershed protection strategy—a practice the City of Ottawa should follow for the watershed of the Marais des Cygnes River and its tributaries and creeks. Urban stream buffers are an integral element of any local stream protection program. By adopting some of these rather simple performance criteria, communities can make their stream buffers more than just a line on a map. Better design and planning also ensure that communities realize the full environmental and social benefits of stream buffers. (Recommendations in this section are adapted from the APA, *PAS Memo* of August 2000.)

The ability of a particular buffer to actually realize its many benefits depends to a large extent on how well the buffer is planned or designed. In general, a minimum base width of at least 100 feet is recommended to provide adequate stream protection.

Three-zone Buffer System

Effective urban stream buffers divide the total buffer width into three zones:

- Streamside;
- Middle core; and
- Outer zone.

Each zone performs a different function and has a different width, vegetative target and management scheme.

The **streamside zone** protects the physical and ecological integrity of the stream ecosystem. The vegetative target is mature riparian forest that can provide shade, leaf litter, woody debris, and erosion protection to the stream. The minimum width is 25 feet from each stream bank. Land use is highly restricted, limited to stormwater channels, footpaths, and a few utility or roadway crossings.

The **middle core zone** extends from the outward boundary of the streamside zone and varies in width depending on stream order, the extent of the 100-year (or one percent) floodplain, any adjacent steep slopes, and protected wetland areas. Its functions are to protect key stream components and provide further distance between upland development and the stream. The vegetative target for this zone is also mature forest, but some clearing may be allowed for stormwater management, access and recreational uses. A wider range of activities and uses are allowed within this zone, such as bike paths and stormwater best management practices (BMPs). The minimum width of the middle core is about 50 feet, but it is often expanded based

on stream order, slope, or the presence of critical habitats (see Buffer Expansion and Contraction).

The **outer zone** is the buffer's buffer, an additional 25-foot setback from the outward edge of the middle core zone to the nearest permanent structure. In many instances, this zone is within a residential backyard. The vegetative target for the outer zone is usually turf or lawn, although the property owner is within a residential backyard. The vegetative target for the outer zone is usually turf or lawn, although the property owner is encouraged to plant trees and shrubs. Few uses are restricted in this zone. Gardening, compost piles, yard wastes, and other common residential activities are promoted within the zone. The only major restrictions are no septic systems and no new permanent structures.

Buffer Crossings

Two major goals of a stream buffer network are:

- To maintain an unbroken corridor of riparian forest; and
- The upstream and downstream passage of fish in the stream channel.

Some provision must be made for linear forms of development that must cross the stream or the buffer, such as roads, bridges, fairways, underground utilities, enclosed storm drains or outfall channels. Some performance criteria could include:

- Crossing width: define a minimum width for maintenance access.
- Crossing angle: direct right angles are preferred, because they require less buffer clearing than oblique crossing angles.
- Crossing frequency: allow only one road crossing within each subdivision, and permit no more than one fairway crossing for every 1,000 feet of buffer.
- Crossing elevation: have all direct outfall channels (the places where effluent is discharged into receiving waters) discharge at the invert elevation, or the lowest point of the stream channel.

Stormwater Runoff

Using buffers for stormwater treatment. The outer and middle zone of the stream buffer may be used as a grass/forest filter strip under limited circumstances. For example, the buffer cannot treat more than 75 feet of overland flow from impervious areas and 150 feet from pervious areas, such as backyards or rooftops. The designer should compute the maximum runoff velocity for both the six-month and two-year storms from each overland flow path, based on the slope, soil and vegetative cover. If the calculations indicate that velocities will be erosive under either condition (greater than three feet per second (fps) for a six-month storm, five fps for a two-year storm), the allowable length of contributing flow should be reduced.

When the buffer receives flow directly from an impervious area, the designer should include curb cuts or spacers so that runoff can spread evenly over the filter strip.

The stream buffer can be accepted as a stormwater filtering system if basic maintenance can be assured, such as routine mowing of the grass filter and annual removal of accumulated sediments at the edge of the impervious areas and the grass filter. The existence of an enforceable maintenance agreement that allows for public maintenance inspection is also helpful.

Location of stormwater ponds and wetlands within buffer. A particularly difficult management issue involves locating stormwater ponds and wetland in relation to the buffer.

Several arguments can be made for locating ponds and wetlands within the buffer or on the stream itself. Constructing ponds on or near the stream allows the greatest possible drainage area to be treated at one topographic point. Also, ponds and wetlands require the dry weather flow of a stream to maintain water levels and prevent nuisance conditions. Lastly, ponds and wetlands add a greater diversity of habitat types and structure and can add to the total buffer width in some cases.

Given the effectiveness of stormwater ponds and wetlands in removing pollutants, one should not completely prohibit their use within the buffer.

Plan Review and Construction

The limits and uses of stream buffer systems should be well defined during each stage of the development process, from initial plan review through construction. The following steps are helpful during the planning stage:

- Require that the buffer be delineated on preliminary and final concept plans;
- Verify the stream delineation in the field;
- Check that buffer expansions are computed and mapped properly;
- Check suitability of use of buffer for stormwater treatment;
- Ensure other best management practices (BMPs) are properly integrated in the buffer; and
- Examine any buffer crossings for problems.

Buffer Flexibility

The courts have generally found that buffer ordinances avoid the taking issue, by proving that buffer strips provide compelling public safety, welfare, and environmental benefits to the community to justify restriction of land use. In order to limit the hardship on developments the following planning methods can be utilized to mitigate any negative impacts associated with the creation of stream buffer strips.

Buffer averaging. Here a community provides some flexibility in the buffer width, permitting the buffer to become narrower at some points along the stream as long as the average width meets the minimum requirement.

Density compensation. This scheme grants a developer credit for additional density elsewhere on the site to compensate for developable land lost to the buffer. Developable land is defined as the buffer area remaining after the 100-year floodplain, wetland and steep slope areas have been subtracted. Credits are granted when more than five percent of developable land is consumed, using the approach shown in **Table 4.12**. The density credit is accommodated by allowing greater flexibility in setbacks, frontage distances, or minimum lot sizes. Cluster development also allows the developer to recover lots that are taken out of production due to buffers and other requirements.

Conservation easements. Landowners should be afforded the option of protecting lands within the buffer with a perpetual conservation easement.

Variances. The buffer ordinance should have provisions that enable an existing property owner to be granted a variance, if the owner can demonstrate severe economic hardship or unique circumstances make it impossible to meet some or all buffer requirement.

Table 4.12: Example of the Use of Density Credits
(To compensate developers for excessive land consumption by buffers.)

Percentage of Site Lost to Buffers	Density Credit*
1 to 10%	1.0
11 to 20%	1.1
21 to 30%	1.2
31 to 40%	1.3
41 to 50%	1.4
51 to 60%**	1.5
61 to 70%**	1.6
71 to 80%**	1.7
81 to 90%**	1.8
91 to 99%**	1.9

Adapted form Burns, 1992.
*Additional dwelling units allowed over base density (1.0)
**Credit may be transferred to a different parcel

OTHER PUBLIC SERVICES

Police

Given the major addition to the department through the construction of a state of the art facility and changes over the last few years relating to staffing and compensation, the Ottawa Police Department does not foresee any dramatic changes or needs for five years. Ongoing support of

staff, vehicles, and policies, should allow the department to function for several years, even with the population growth expectations.

Fire Protection

The Ottawa Fire Department is committed to making the best possible use of available resources toward the achievement of its mission. To that end, the department is constantly working to become as effective and efficient as possible. Every community that has a recognized fire department is periodically evaluated by the Insurance Services Office (ISO) to determine a community's public protection classification. The goal of rating communities is to provide better insurance rate equity in recognizing public fire suppression abilities, but, aids the department as well as an independent evaluation is conducted and feedback given. The OFD was last surveyed in June of 1994 and is currently rated class 4, with 1 as the best rating.

A major goal of the OFD is to continue to evaluate and improve all aspects of our delivery and service, and to request a future ISO evaluation and receive a lower rating in the future. Some future benefits of obtaining a lower ISO rating:

- Potential reduction in insurance premiums paid by local residents and property owners.
- Competitive advantage when applying for grant funding.
- Benchmarking against other agencies for best practices.
- A detailed plan for addressing performance improvement opportunities.
- Recognition as a progressive and effective department among other departments.

Ottawa Municipal Airport

The Airport Master Plan recommends purchase of adjacent land for extension of the runways in the near-term (1999-2004) and in the mid-term (2005-2010). The Plan also recommends purchase of navigation easements in some adjacent property **(Ref. Figure 4.7 and the Ottawa Municipal Airport Master Plan document)**. The first priority of the master plan was to improve the parallel taxiway, which was done in late 2003 (photo below). The next master plan priorities, in order of priority with estimated cost, are:

- Install PAPI-2L - Runway 17 $ 35,000
- Purchase Property - Runway 35 $ 32,625
- Install PAPI-2L - Runway 35 $ 35,000
- Rehabilitate Apron / Tie-Down Area $ 512,028
- Purchase Property - Runway 17 $ 42,563

The city continues to consider the addition of jet fuel tanks, t-hangers, storage, etc. The addition of these things as well as various funding sources for upgrades is ongoing.

A storm in July 2009 destroyed the airport's primary hangar, resulting in construction of a new 12,000 square foot hangar in 2010.